UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,295	10/10/2003	Stephen R. Schroeder	SI-US-2	3084

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ART UNIT	PAPER NUMBER
2635	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/684,295	SCHROEDER, STEPHEN R.
	Examiner	Art Unit	
	Sean Motsinger	2635	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>10 October 2003</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-33</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) <u>20- 24</u> is/are allowed.

6)☒ Claim(s) <u>1,5-7,12,14,17-19,25-27,29,31 and 32</u> is/are rejected.

7)☒ Claim(s) <u>2-4,8-11,13,15,16,28,30 and 33</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>10 October 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Objections to the specification

1.   The specification is objected to for the following informalities: The word "course"

should be spelled "coarse" throughout the application.

Claim Objections

2.   Claim 4 is objected to because of the following informalities: both the non-

overlapping region of the first image, and the non-overlapping region of the

second image lack antecedent basis. Appropriate correction is required

3.   Claim 18 is objected to because of the following informalities: the word "course"

should be spelled as "coarse"

4.   Claims 2-4,8-11,13,15-16, 28,30,33 are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in independent form

including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6.   Claims 1, 5-7, 12,14,17-19, 25-27, 29, 31-32 are rejected under 35 U.S.C. 102(e)

as being anticipated by Benkelman US Patent No 6,694,064 hereinafter

"Benkelman".

7.   Re claim 1 Benkelman discloses: A method comprising:

        selecting a first set of points in a first image, the first set of points located

in an overlap region of the first image and a second image (column 3 lines 20-

33); Note first set is the set of interesting points.

        determining a set of tie points in the second image, each tie point

correlating to a point in the first set (column 3 lines 20-33);

        determining a second set of points, each point in the second set located at

a position in the overlap region between a point in the first set and a tie point

correlated to the point in the first set; (column 12 lines 2-8) (column 12 lines 2-8)

Note the second set is the set of midpoints

        and warping the first image and the second image by applying an

algorithm using the second set of points, the algorithm to reposition at least a

portion of points in the first image and at least a portion of points in the second

image. (column 12 lines 2-8, column 12 equations 3-5 and column 12 lines 60-

64) Note since each image was warped to the mid point so at least a portion of

each image was warped.

8.   Re claim 5 Benkelman further discloses: wherein the portion of the first image

includes points in the overlap and points within a predetermined distance from

the overlap. (column 12 lines 10-23) Note that the whole of each image is

repositioned this would include points outside the overlap region.

9.   Re claim 6 Benkelman further discloses: wherein determining the set of tie points

comprises, for each point in the first set:

        selecting a patch comprising the point and a set of neighboring points

located within a first predetermined distance from the point; (column 10 lines 48-

54) Note the size of the subject correlation window would define the

predetermined distance.

        selecting a first potential tie point in the second image corresponding to

the same location as the point; (column 10 lines 35-45 column 11 lines 32-36)

Benkelman shows that a search window created in the target image (second

image) around the SSP which corresponds to the SSP associated with the IP(the

point) in the first image (ie the same location as the tie point is in the search

window). Note if every pixel was tested in a region about the point it would clearly

also include the point.

determining a set of potential tie points in the second image, the set of

potential tie points including the first potential tie point and one or more additional

potential tie points located within a second predetermined distance surrounding

the first potential tie point; (column 11 lines 32-36)   Note the set of tie points is

the points in the search window which are in a predetermined distance

surrounding a first potential tie point. Where the predetermined distance is

defined by the size of the search window

for each potential tie point, calculating a correlation between points in the

patch and the potential tie point and neighboring points located in the second

image within the first predetermined distance from the potential tie point; (column

10 lines 48-54 equation 2) Please note in calculating the correlation between

patches of the two images is shown in calculating NCC

and if a good correlation (NCC Value) exists, selecting a tie point

corresponding to a potential tie point with the best correlation. (Column 11 lines

10-18)

10.   Re claim 7 Benkelman further discloses: The method of claim 6, further

comprising if a good correlation (NCC value) does not exist, removing the point

from the first set. (Column 11 lines 14-18)

11.   Re claim 12 Benkelman further discloses: The method of claim 6, further

comprising before selecting the first potential tie point, reducing the resolution of

the patch by a resolution parameter and reducing the resolution of at least a

portion of the second image by the resolution parameter. (column 11 lines 24-26)

Please note that the resolution must be reduced by some amount to do the

appropriate calculations, which inherently implies some resolution parameter was

used.

12.   Re claim 14 Benkelman further discloses: The method of claim 1, further

comprising before determining the second set of points: analyzing a plurality of

neighboring tie points; and if the tie point is not similar to the neighboring tie

points, removing the tie point from the set of tie points and removing the point in

the first set correlated to the tie point from the first set. (column 11 lines 43-63)

Note that here the user is given the option of approving or rejecting tie point

pairs. This will result in analyzing a tie point and its neighbors. If the tie point is

erroneously identified it will not be similar to neighboring tie points which were

correctly identified, and the user will reject the pair since it is erroneously

identified. Since only approved tie points are used in aligning the images this has

the effect of removing the tie point from the set of tie points and removing the

point in the first set correlated to the tie point from the first set.

13.   Re claim 17 Benkelman further discloses: The method of claim 1, wherein each

point in the second set is located halfway between a point in the first set

corresponding to the point in the second set and the tie point corresponding to the point in the second set. (Column 12 lines 2-10)

14.   Re claim 18 Benkelman further discloses: The method of claim 1, further comprising: before selecting a first set of points, receiving a set of user correlations correlating an initial set of points in the first image to initial tie points in the overlap region of the second image, and using the set of user correlations to perform a course mapping between points in the overlap region of the first image and the second image; and using the course mapping to determine the set of tie points. Column 7 lines 1-10 of Benkelman discloses initially aligning (ie. course mapping) of the image manually. To do this a user must take at least a part of the first image(initial set of points in the first image) and line it up (ie correlate) it with at least an overlapping part of the second image (initial tie points). This initial alignment is the used to find the tie points column 7 lines 50-55.

15.   Re claim 19 Benkelman further discloses: The method of claim 1, wherein the first and second images comprise satellite images. Column 1 lines 20-25

16.   Re claim 25 Benkelman discloses: A method comprising the steps of:

a step for selecting a first set of points in a first image, the first set of

points located in an overlap region of the first image and a second image

(column 3 lines 20-33);Note the first set is the set of interesting points.

a step for determining a set of tie points in the second image, each tie

point correlating to a point in the first set; (column 3 lines 20-33);

a step for determining a second set of points, each point in the second set

located at a position in the overlap region between a point in the first set and a tie

point correlated to the point in the first set; (column 12 lines 2-8) Note the second

set is the set of midpoints

and a step for warping the first image and the second image by applying

an algorithm using the second set of points, the algorithm to reposition at least a

portion of points in the first image and at least a portion of points in the second

image. (column 12 lines 2-8, column 12 equations 3-5 and column 12 lines 60-

64) Note since each image was warped to the mid point so at least a portion of

each image was warped

Claim 25 was not interpreted to invoke USC 112 6th paragraph as

sufficient description of the step followed the "step for" statement.

17.   Re claim 26 Benkelman further discloses: The method of claim 25, further

comprising the steps of:

for each point in the first set, a step for selecting a patch comprising the point and a set of neighboring points located within a first predetermined distance from the point; (column 10 lines 48-54)

a step for selecting a first potential tie point in the second image corresponding to the same location as the point; (column 11 lines 32-36) Please note if every pixel was tested in a region about the point it would clearly also include the point.

a step for determining a set of potential tie points in the second image, the set of potential tie points including the first potential tie point and one or more additional potential tie points located within a second predetermined distance surrounding the first potential tie point; (column 11 lines 32-36)

for each potential tie point, a step for calculating a correlation between points in the patch and the potential tie point and neighboring points located in the second image within the first predetermined distance from the potential tie point; (column 10 lines 48-54 equation 2)

and if a good correlation exists, a step for selecting a tie point corresponding to a potential tie point with the best correlation. (Column 11 lines 10-18)

This claim was not interpreted to invoke 112 sixth paragraph as sufficient description for the step followed the claim.

18.   Re claim 27 Benkelman further discloses: The method of claim 26, further

comprising: before the step for selecting the first potential tie point, a step for

reducing the resolution of the patch by a resolution parameter and a step for

reducing at least a portion of the second image by the resolution parameter.

(column 11 lines 24-26)

       This claim was not interpreted to invoke 112 sixth paragraph as sufficient

description for the step followed the claim.

19.   Re claim 29 Benkelman discloses: One or more machine-readable mediums

having stored thereon sequences of instructions, which, when executed by a

machine, cause the machine to perform the actions: (column 6 lines 34-40)

       selecting a first set of points in a first image, the first set of points located

in an overlap region of the first image and a second image; (column 3 lines 20-

33);

       determining a set of tie points in the second image, each tie point

correlating to a point in the first set; (column 3 lines 20-33);

       determining a second set of points, each point in the second set located at

a position in the overlap region between a point in the first set and a tie point

correlated to the point in the first set; (column 12 lines 2-8)

       and warping the first image and the second image by applying an

algorithm using the second set of points, the algorithm to reposition at least a

portion of points in the first image and at least a portion of points in the second

image. (column 12 lines 2-8, column 12 equations 3-5 and column 12 lines 60-64)

20.   Re claim 31 Benkelman further discloses: The mediums of claim 29, further comprising instructions which, when executed by the machine, cause the machine to perform the actions of:

selecting a patch comprising the point and a set of neighboring points located within a first predetermined distance from the point; (column 10 lines 48-54)

selecting a first potential tie point in the second image corresponding to the same location as the point; (column 11 lines 32-36)

determining a set of potential tie points in the second image, the set of potential tie points including the first potential tie point and one or more additional potential tie points located within a second predetermined distance surrounding the potential tie point; (column 11 lines 32-36)

for each potential tie point, calculating a correlation between points in the patch and the potential tie point and neighboring points located in the second image within the first predetermined distance from the potential tie point; (column 10 lines 48-54 equation 2)

and if a good correlation exists, selecting a tie point corresponding to a potential tie point with the best correlation. (Column 11 lines 10-18)

21.   Re claim 32 Benkelman further discloses: The mediums of claim 31, further

comprising instructions, which, when executed by the machine, cause the

machine to perform the action of:

Before selecting the first potential tie point, reducing the resolution of the

patch by a resolution parameter and reducing the resolution of at least a portion

of the second image by the resolution parameter. (column 11 lines 24-26)

Allowable Subject Matter

22.   Claims 20-24 are allowed. While Delauney triangulation is used for the purposes

of image warping in "Image Warping with Scattered Data Interpolation"

Ruprecht, D.; Muller, H.; Computer Graphics and Applications, IEEEVolume 15,

Issue 2, March 1995 Page(s):37 – 43. However, the Reason claims 20-24 are

allowed is that there is not motivation in the prior art of the knowledge of one of

ordinary skill in the art to take a Delauney triangulation of the second set of

points and then warp both the first image and the second image using second

sets of points as claimed.

23.   Claims 2-4,30 contain allowable subject matter because of the same use of

Delauney triangulation for the image warping application.

24.   Claims 8-10 contain allowable subject matter because although Givens et al. US

5577181 took into account a situation where multiple correlations exceed a

threshold but further processing was done to select from them. It was not

determined that a good correlation did not exist after receiving multiple high correlations, as claimed.

25.   Claim 11 contains allowable subject matter prior art does not disclose the use of a histogram to calculate a bimodal coefficient to determine if the point was in a shadow as claimed.

26.   Claim 15-16 prior art does not disclose analysis of the similarity of a tie point pair by relating the displacement or angular variance of one pair vs. the displacement of the other pairs then rejecting this pair if the displacement was incorrect, as claimed

27.   Re claim 13,28,33 because although Givens et al. US 5577181 teaches restoring the resolution and performing the correlation it does not teach setting the second predetermined distance equal to two times the reduced resolution parameter, as claimed.

Query

28.   The inclusion of the article entitled "The Space Imaging Registration and Warp Algorithm" is queried since it has a disclaimer on the front, which specifically states it was never in the public domain. The examiner wishes to know if and when this invention was indeed ever publicly known, disclosed or used as in 35 U.S.C. 102(b) to qualify as prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean Motsinger whose telephone number is 571-270-1237. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marvin Lateef can be reached on 571-270-1245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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